Date: Sun, 8 May 94 04:30:26 PDT
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: Bulk
Subject: Ham-Homebrew Digest V94 #122
To: Ham-Homebrew

Ham-Homebrew Digest   Sun, 8 May 94   Volume 94 : Issue 122

Today's Topics:

Send Replies or notes for publication to: <Ham-Homebrew@UCSD.Edu>
Send subscription requests to: <Ham-Homebrew-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Homebrew Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-homebrew".

Date: 8 May 94 02:52:52 GMT
From: ihnp4.ucsd.edu!agate!howland.reston.ans.net!vixen.cso.uiuc.edu!
uicsl.csl.uiuc.edu!eagle.csl.uiuc.edu!gene@network.ucsd.edu
Subject: Build Hi-Pwr SS Linear
To: ham-homebrew@ucsd.edu

A month or two ago I suggested the possibility of home-brewing your own low-cost High-Power Solid-state Linear on the 160-80-40 meter bands. I will report my progress.

I will insert here, my opinion that I think this computer-networking system is a very valuable NATIONAL RESOURCE that provides almost limitless possibilities for fostering the massive, untapped creative talents of the thousands of readers using the system.

First, I will state some of the intitial factors that I thought were attractive:

1. Low-cost 400v-2.5A MosFets are available for < $2 ea.
2. Full-wave rectifiying your household 230v line yields massive power capabilites (with 10,000 ufd-200v capacitors, mine only dropped about 5% [169v to 161v] for load-current change from 1/2A to 7.5A).
3. The household "neutral becomes the circuit common"...but still remains isolated from the case (and earth ground) by isolated pri-sec windings on both the input transformer(from the transceiver), and the output tank coil (to the 50 ohm antenna).
4. Since the majority of amateurs own 100 watt transceivers, you are given the luxury of wasting drive-power to accommodate very low-ohm swamping resistors across the inputs to the high-capacitance MosFet inputs (I used 12-ohm, 2W carbon from each half of the Push-pull circuit to RF ground...i.e. the forward bias line.
5. Again, because of surplus drive-power available, I used 24-ohm, 4W in series with each end of the input transformer secondary(a 1:1 50 ohm broad-bander, wound on a toroid), to each gate-group. Actually, the 24 ohms were two 47 ohm-2w carbon. This makes the input impedance almost a pure 50 ohm, and makes your transceiver very happy. It also provides a modicom of isolation against possible transients being sent back to your transceiver when you blow your first Mosfets....yes, you are likely to have this happen during experimentation, unless you are v

ery careful, or very lucky! With 165v stored in 10,000 uf, the MosFets literally explode like a fire-cracker (Thankfully, my eight IRF-722's only cost $1.50 each...yes they all go at once...but the next type I want to experiment with will cost $1.22 ea, and I hope will go higher in frequency.

Since this is getting quite lengthy, I will try to give a general description of my circuit:

First let me admit that I went into this quite naiively (sp) and had several nasty surprises, but the bottom line is that I have been on the air with a good-quality signal providing 600W PEP out on 160 meters, and 500W PEP out on 80 meters. That's not to say that I couldn't get a little more than that, but after a few "4th-of-July firecrackers", you get a little "gun-shy".

First, I limit my power-up surge current by using a 50- ohm, 20w resistor in series with the rectiers and the 10,000 uf. After a second or two this gets shorted out with relay contacts (A thermistor is not suitable here, because in SSB service, the quiescent power does not get it hot enough). Not meaning to confuse the issue, but I had used a relay with two contacts in parallel and I noticed that one closed a little ahead of the other and was getting considerable abuse, because even though the 10,000 uf gets about half-charged before the relay closes, the remaining surge-current ocurring for continuing to full charge is still large (house-lites blink slightly)..so used the first contact to short the 50-ohm, but used an additional 6-ohm which the second contact shorts out a few milliseconds later.

This is worthwhile, because so many times when one participates in a large group of amateurs, he may not contribute more that 3 or 4 minutes of talk over

a 3 or 4 hour period, except to station-identify every 10 minutes. I like to power-up briefly to identify, and then turn off the linear for another 10 minutes!

I use eight IRF-722's (these happen to be by Harris) in parallel-pushpull. Each of the individual eight have a ferrite-bead and an 18-ohm, 1/4w resistor immediatley at the gate (bead slides over Fet-pin). Also, each individual source has a 2-ohm source resistor (two 3.9-ohm, 1w-carbon in parallel) , attached immediately at the Fet's source pin. For circuit common, or perhaps you could refer to it as circuit-ground, I route a #12 copper bus to within reach of the ground-end of the source resistors.

The outboard end of the 18-ohm gate resistors, are grouped...four in common for 1/2 of the Push-Pull arrangement, and the other four in the other half.

These junctions then have a 12-ohm 2w carbon from each of them to a common forward bias line from a zener-regulated +5 source...with a 200 ohm pot to provide 0 to +5 to the midpoint of the two 12-ohm resistors, and I also tie the center-tap of the secondary of the broad-band input transformer to this point. I can happily report that I never saw any evidence of instability or parasitic oscillations!

My first approach used a broad-band ferrite transformer in the drain-to-drain out-put circuit. Unfortunately, there were severe glitches and wave-form distortions that were supported by this broad-band transformer...it remained the same at low power levels so am quite certain there was no core saturation etc. Actually you may find many little surprises when dealing with these low-cost high inp-capacitance MosFets....some strange phenomenon concerning "cell-to-cell propagation in the gate-capacitance" which I don't understand. I do know that when I tried a source-follower configuration using a broad-band load, I observed a myriad of clean, sharp, high-amplitude narrow pulses superimposed on the basic sine-wave!

I`m straying off the main topic....anyway, to continue, I found that my original idea of using a broad, resonant LC circuit in the output worked beautifully on 160 meters! It may be hard to think in such low-impedance terms for those used to Vacuum-tube designs, but the principles remain the same; I estimate my drain-to-drain impedance to be approximately 80 ohms.

On 160 meters, my inductor was a 3 turn, 4" dia. made of 1/4" copper tubing. Each end of this had a heavy-duty type .012 uf mica capacitor from each end to common-circuit-ground. I believe the Q is approx 7 to 10... broad enough to cover 1.8-2.0 MHz. The output secondary is simply a wire with good-quality insulation, threaded thru the copper tubing and connected directly to the output coax connector....which is case ground (earth ground)

Incidentally, the earth-ground (green-wire) of the household power also connects to the case. Parenthetically, I didn't take time to run a conventional 230 connector to mine...I simply used two 3-wire 120 power cords plugged into two different outlets in the room which had opposite phase (be sure to verify correct phase and use only polarized 3-wire plugs).

The distortion was purified beautifully by the resonant LC circuit on 160 meters. Unfortunately, using similar Xc (Q) on 80 meters did not clean up the wave form to an acceptable degree. I first added a 5-element Chebychev 50-ohm filter from the ARRL Handbook. It still was not quite clean

enough, but when went to 7-element (4 inductors, 3 capacitors) it cleaned up nicely. I used a small size coffee-can (with its cut-out bottom-piece tack-soldered in the center for the middle capacitor and two middle inductors, then added same-diam smaller- height cans for the outside ends (Peanut cans??)...this provides shielding between air-wound inductors. `Didn't bother covering outside ends. I had tried a smaller ferrite toroid from the junk box, but they got very hot at 600w and probably saturating.

On 80 meters, about 40 watts of drive was required to drive the linear to 500w PEP out. Of course most of this is arbitrarily wasted, and it`s quite likely that it could be successfully driven with much less...probably with the smaller-power transceivers with plug-in modules now offered by TenTec for around $500...called the Scout, I believe.

One more construction feature worth mentioning....the four MosFet drain-tabs in each group are mounted directly on one of the two large heatsinks. Of course the heat-sink itself must be insulated for at least 350 volts, but stray capacitance is of no concern at these low-impedance, lower frequencies (witness the .012 uf from each heat-sink to ground).

I do use a small muffin blower fan and that's always desireable, but mine run so modestly warm that I'm not sure it's an absolute necessity if one avoids long "key-down" carrier. MosFets seem to operate with amazingly low quiescent current requirement to eliminate cross-over distortion!

I apologize for such a lengthy posting... I hope there's enough general interest to justify it. I hope many will "put their toe in the water" and post any new observations of interest to the net. I have learned quite a bit (albeit the hard way) and plan to soon experiment with a further idea:

There are probably better MosFet options that I'm not aware of with my rather isolated environment, but one that I'm interested in is the Motorola MTP-1N60. It is a 600v-1A, that appears to have switching characteristics considerably faster. It's drain-to-drain impedance would probably be about 4 times as high, which would be more practical for the LC output resonant tanks, with a convenient 4:1 stepdown broad-balun to match the 50 ohm antenna. The 240v line (120-0-120) would need to be negative-rectified also to provide 320vdc. Of course, the "circuit-common" would now be down at the -160v level, but don't believe this would be a problem because of the isolation provided by the input and output scheme as mentioned above.

It is my belief (naiive tho it may be) that the higher-speed switching characteristics do not get compromised, even though many MosFets are connected in parallel; only the drive requirements must be dealt with, but again, with much reserve power from the transceiver, and with the higher-speed transistors having lower input capacitances, I think it is quite practical to consider using as many as 10 or 12 to easily get 1Kw PEP out.

With my experience-to-date, it appears that as long as you put the individual ferrite-bead and lo-ohm resister at each gate, stability is maintained. Also, Mosfets on the same heatsink, have the fortunate feature of heat-shifting if they get much disparity. Even though the "quiescent" isn't quite as fortunate, with many in parallel...and with the remarkabley-low quiescent current requirement....my meager experience

so far seems to be that it's no problem even when all are biased off a common bias-line.
  One more last thought as long as I've gone this long....I plan to put a simple SWR bridge in the output line, so that if the SWR gets to an unacceptable level, it will cause a transistor on the forward-bias line to conduct and kill the forward-bias (this is 3.5 volts in my case).
  Unlike vacuum-tubes, MosFets are rather unforgiving and after a few milliseconds, it's too late. Which reminds, I didn't mention above that I put a pair of back-to-back zeners from each gate-group, to circuit-ground (total of 4 15-v zeners). Even though this includes the drop across the emitter-resistor, it's still within the bounds (+ or - gate to source breakdown voltage-limit).   ......Finally, the END!
--

Internet, BITNET: gene@csl.uiuc.edu

Date: 08 May 1994 07:48:19 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!noc.near.net!chaos.dac.neu.edu!chaos.dac!dean@network.ucsd.edu
Subject: DC-100 Mhz VCO Chip
To: ham-homebrew@ucsd.edu

Hi:
     Does anyone know if there is such a thing as an inexpensive DC-100Mhz vco chip out there?

-Dean

Date: Sat, 7 May 1994 04:16:27 GMT
From: ihnp4.ucsd.edu!pacbell.com!amdahl!juts.ccc.amdahl.com!p1dbg02!dws30@network.ucsd.edu
Subject: MOSFET Power Amp Schematics/Info ???
To: ham-homebrew@ucsd.edu

Subject says it all for the most part. Toying with the idea of building a QRP Amp out of MOSFETS. Any schematics or pointers to information would be greatly appriciated. Want to build one for VHF/UHF and HF when I tackle the code and are up to speed. (Beginner = Low Wattage)

--

 Dave Sharpe Sunnyvale Ca. DWS30@duts.ccc.amdahl.com

Date: 6 May 1994 21:16:32 GMT
From: ihnp4.ucsd.edu!usc!nic-nac.CSU.net!charnel.ecst.csuchico.edu!psgrain!
news.tek.com!tekgp4.cse.tek.com!royle@network.ucsd.edu
Subject: rheostats
To: ham-homebrew@ucsd.edu

To: jlundgr@eis.calstate.edu (John E. Lundgren):

>In my line of thinking, a RHEOSTAT is a potentiometer that's over the 1
>watt size, usually in the tens of watts. Like the things they used to
>use for dimming lamps. I didn't know that they even had audio taper
>rheostats.   Tell us more.

Common usage in electronics is that a rheostat is a two-terminal
variable resistor; a poentiometer can be connected as a rheostat
by shorting the tap with one of the ends or by leaving one of the
ends disconnected.

Roy Lewallen, W7EL
roy.lewallen@tek.com

Date: Sun, 8 May 1994 01:31:53 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!EU.net!uknet!bnr.co.uk!corpgate!
news.utdallas.edu!feenix.metronet.com!copeland@network.ucsd.edu
Subject: RTTY with regular modem?
To: ham-homebrew@ucsd.edu

In article <mgalatz.1118627256E@198.7.0.1>,
Menachem Galatz DC <mgalatz@panix.com> wrote:
>Is there a way to read RTTY with a regular phone modem?

I know UARTS (8250,16550) both support 5 bit ASCII (baudot), but
don't know what modulation technique RTTY uses.

Can this be done?
--

| copeland@metronet.com |

Date: 6 May 1994 23:05:25 GMT

From: ihnp4.ucsd.edu!usc!elroy.jpl.nasa.gov!ncar!ren@network.ucsd.edu
Subject: SUMMARY: Texas Instruments Speech Chip Uses
To: ham-homebrew@ucsd.edu

This is a follow-up to my SUMMARY posting made a couple
weeks ago.
     Several kind individuals responded to my (null)
summary with positive (what to you expect with electronics folks B*)
(Bad Pun! Sit Down!) feedback.
     A mid-80's Popular Electronics article discussed hacking
the "Speak & [verb]" toys. One of the respondents has offered to
photocopy the article (once I get around to sending him a SASE)
(and once he gets back from his honeymoon)
(Thanks Mark!)
     To give them recognition due, Thanks to,

ed@fore.com (Ed Bathgate)
trier@ins.cwru.edu (Stephen C. Trier)
mark@era.com (Mark Feit)

ren N0PVI
dona nobis pacem

Date: Sat, 7 May 1994 15:27:45 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!pipex!lyra.csx.cam.ac.uk!warwick!
str-ccsun!strath-cs!cen.ex.ac.uk!jmvasnie@network.ucsd.edu
Subject: Vertical yagi mounting
To: ham-homebrew@ucsd.edu

boyer@rd.eng.bbc.co.uk writes:
> William P. Osborne (wosborne@nmsu.edu) wrote:
> : On Thu, 28 Apr 1994 20:55:12 GMT,
> : Paul H. Bock <phb@syseng1.melpar.esys.com> wrote:
>
> : >   In a recent on-the-air discussion, I pointed out the error
> : >of mounting a two-meter yagi in the vertically-polarized
> : >position while using a metal mast (assuming that the antenna
> : >mounts from the center of the boom and not at one end, the
> : >latter being common for 3- and 4-element yagis).
> : Paul: This is an excellent problem for testing with the newer versions of
> : MIninec or NEC on the market. I have done a good bit of modeling of
> : stacked and interlaced 10/15/20 meter yagis and can confirm that a 20 meter
> : element in the middle of a 15 meter yagi is bad news in that it can cost
> : you 1 to 1.5 dB of gain, change the input Z some and cause most anything to
> : happen to the front to back. I have not tried a random length mast but I
> : would expect the same sort of results. 73 Bill

>
>
> I did a little modelling with NEC. I first constructed a rough 4 ele yagi
> and got a resonable pattern. Then I added a long vertical pole roughly in the
> center of the yagi. This really buggered the pattern. Ok so I did this at
> Band II where I have a good idea of the size of things off the top of my
> head, but it still applies to 2m. Here is my NEC input file.
>
> CM vertical Yagi
> CM
> CM
> CE
> GW1,25,0.,0.,-.9,-.,0.,.9,.01,
> GW2,25,.76,0.,-.76,.76,0.,.76,.01,
> GW3,25,1.3,0.,-.6,1.3,0.,.6,.01,
> GW4,10,1.9,0.,-.6,1.9,0.,.6,.01,
> GW5,25,1.,0.,-2.65,1.,0.,.35,.03,
> GE0,0,0.,
> EX0,2,13,00,1.,0.,
> FR0,1,0,0,96.,0.,0.,
> RP0,1,359,1010,90.,0.,0.,1.,0.,0.,
> EN
>
>
> So I guess the answer is don't use a metal pole with a vetical yagi.
>
>
> John B
>
> John.boyer@rd.eng.bbc.co.uk
>
>

Date: 07 May 1994 07:58:45 GMT
From: news.bu.edu!noc.near.net!chaos.dac.neu.edu!chaos.dac!dean@purdue.edu
Subject: Wanted : info and/or tutorial on the use of varactor diodes
To: ham-homebrew@ucsd.edu

Hi:
     Is there an ftp site or magazine where I could get a tutorial on the
use of Varactor Diodes? Anyone?

-Dean

Date: 5 May 94 15:23:35 EDT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!EU.net!sunic!psinntp!psinntp!
main03!landisj@network.ucsd.edu
To: ham-homebrew@ucsd.edu

References <2pr5d1$l20@watnews1.watson.ibm.com>,
<2q3jks$bhl@dartvax.dartmouth.edu>, <hamilton.767917015@BIX.com>sj
Subject : Re: Newbie code Practice receiver -- feasible?

In article <hamilton.767917015@BIX.com>, hamilton@BIX.com (hamilton on BIX)
writes:
...
> My advice is to not to waste your money on something cheap. You only
> get what you pay for. If you're looking for some inexpensive code
> practice, get the ARRL code practice tapes. They _really_ work and
> they're really worth the money.
>
> Don't expect to practice with the W1AW signals (depending on your
> location) until you get a "real" radio.
>
>
> Regards,
> Doug Hamilton   KD1UJ   hamilton@bix.com   Ph 508-358-5715
> Hamilton Laboratories, 13 Old Farm Road, Wayland, MA 01778-3117, USA

You can get an old Heathkit reciever or transceiver for under $100, and a good
one, at that. I got my code up from 5WPM to over 20 by listening to tapes made
from W1AW on my old SB303. There was an SB303 posted for sale here recently for
$90. This is a great 2nd receiver to have around too. Or you can always sell
it for about what you paid for it.

Joe - AA3GN
--
Joe Landis - System & Network Mgr. - North American Drager Co.
landisj@drager.com | uupsi5!main03!landisj | AA3GN @ WB3JOE

End of Ham-Homebrew Digest V94 #122
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